Remarks

Currently pending in the application are claims 1-5, 8-11 and 13-15. Claims 1, 8 and 13 have been amended to further distinguish Applicant's invention. Support for these amendments can be found at, for example Examples 2-4 on page 8 of the present application.

35 U.S.C. § 103(a)

The Examiner rejected claims 1-5 under 35 U.S.C. § 103(a) as being unpatentable over Das et al. (US 5,922,44) in view of Blykahman (U.S. Pat. No. 5,591,811) and further in view of Goswami et al. (U.S. Pat. No. 4,652,398). The Examiner also rejected claims 8-11 and 15 as being unpatentable over Das et al. in view of Blykahman and further in view of Goswami et al. and Klein et al. (U. S. Pat. No. 6,245,835). Finally, the Examiner rejected claim 13 and 14 as being unpatentable over Das et al. (US 5,922,448) in view of Blyakhman and further in view of Goswami et al. Applicant traverses these rejections for the following reasons.

As presently claimed, claim 1 is directed to a composition containing A) a 1-imidazolylmethyl-substituted 2-naphthol compound of the general formula (I) and B) a phenol selected from the group consisting of 1,4-n-pentylphenol, n-hexylphenol, n-heptylphenol, n-octyphenol, n-decylphenol, and O,O'-diallyl-bisphenol A with a weight ratio of component A) to component B) being from 30:70 to 70:30. Additionally, claim 8 is directed to a curable composition containing A) and B) components above at a weight ratio of component A) to component B) being from 30:70 to 70:30 together with an epoxy resin, curing agent and optionally additives, and claim 13 is directed to a method of making such a curable composition.

Das et al. teaches a resin blend containing a multifunctional phenolic cyanate/phenolic triazine copolymer ("PT resin") in combination with an epoxy resin which, when cured, provides an article having improved thermal and mechanical properties. Das et al. further teaches the resin blend may optionally contain a catalyst to increase cure time. Suitable catalysts taught by Das et al. include metal catalysts; nonylphenol; and imidazoles selected from 1-methyl imidazole, 2-ethyl-4-methyl imidazole, 2-phenyl imidazole, and 2-methyl imidazole. Das et al. further teaches that 15-25% by weight of the catalyst may be predissolved in an alkyl phenol solvent before being added to the blend, so that "the total amount of catalyst in the homogeneously blended blend is from 0.06 to about 0.07 percent, based on the total weight of the blend." *See Das et al.* at col. 10, lines 3-6.

The Examiner had added Blykahman to Das et al. for the purpose of teaching the 1-imidazolylmethyl-substituted 2-naphthol compound of the general formula (I). However, neither Das et al. nor Blykahman, alone or together, teach or suggest a composition containing 1-imidazolylmethyl-substituted 2-naphthol compound of the general formula (I) in combination with a phenol selected from the group consisting of 1,4-n-pentylphenol, n-hexylphenol, n-heptylphenol, n-octyphenol, n-decylphenol, and O,O'-diallyl-bisphenol A with a weight ratio of the compound of formula (I) to phenol being from 30:70 to 70:30 as presently claimed.

The Examiner has added the teachings of Goswami et al. for the purpose of teaching the combination of an epoxy resin, O,O'- diallylbisphenol A and an imidazole. However, Goswami et al. teach a significantly smaller amount of imidazole to O,O'-diallylbisphenol A than presently claimed. In particular, Goswami et al. teach the use of

0.1% to 1% by weight of imidazole and 10% to 25% by weight of O,O'-diallyl bisphenol A which corresponds to a ratio ranging from a 0.4:99.6 to 9.1:90.9 of the imidazole component to phenol component. *See US 4,652,398* at col. 3, line 35 to col. 4 line 24. Further demonstrating this ratio of ranges are Examples 1-5 in which 2-ethyl-4-methyl imidazole is combined with N-methyl pyrrolidone solvent to form a 10% solution while 2,2'-diallyl bisphenol A is combined with N-methyl pyrrolidone solvent to form a 67% solution. *See id.* at col. 6, line 45-47. Thus, the Example the Examiner refers to (Example 2) contains 0.2 parts of imidazole and 4.69 parts of 2,2'-diallyl bisphenol A rendering a ratio of 4.1:95.9 of the imidazole component to phenol component. Examples 1 and 3-5 contain even smaller amounts of imidazole (i.e. 1.6:98.4 and 2.4:97.6 of the imidazole component to phenol component). Thus, Goswami et al. does not teach or suggest a ratio of imidazole component to phenol component that is even close to Applicant's presently claimed ratio.

Moreover, Applicant's claimed ratio is not one that has been optimized within the conditions taught in Das et al. or Goswami et al. by routine experimentation rendering Applicant's claims obvious. It is well established only result-effective variables can be optimized. *See MPEP § 2144.05 B* ("a particular parameter must first be recognized as a result-effective variable, i.e. a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation.").

Neither Das et al. or Goswami et al. teach or suggest the imidazole component, when present, does anything other than routinely cure their resin blends. *See, for example, U.S. Pat. No. 5,922,448* at col. 8, ll. 20-22 ("The blend of the present invention

may also optionally contain [an imidazole] catalyst for the purpose of increasing the cure rate."); *US 4,652,398* at col. 4, lines 11-16 ("This [imidazole] curing agent, although needed to cure the system, can be added by someone other than the formulator of the adhesive and it is therefore considered an optional component in regard to the curable adhesive composition.").

Nevertheless, Applicant has surprisingly found the curing of epoxy resin systems at low temperatures can be accelerated and cured articles having higher than expected interlaminar shear strength can be achieved when 1-imidazolylmethyl-substituted 2-naphthol compounds of the formula (I) are combined with 1,4-n-pentylphenol, n-hexylphenol, n-heptylphenol, n-octyphenol, n-decylphenol, or O,O'-diallyl-bisphenol A, at a weight ratio of the compound of formula (I) to phenol being from 30:70 to 70:30. In particular, the claimed combination of the present invention is able to cure an epoxy resin system at low temperatures of between 60°-75°C (rather than temperatures greater than 100°C as generally taught) to provide cured articles having interlaminar shear strength values up to 50 MPa which is substantially higher than a composition containing the imidazole alone. *See present application* at Table 2, page 8. The Applicant found this both surprising and unexpected and this is neither taught nor suggested in Das et al. Blykahman or Goswami et al.

Similarly, adding Klein et al. also does not bring one skilled in the art closer to Applicant's invention. Klein et al. has been added for the purpose of teaching a polyoxypropylenediamine curing agent. However, for all of the reasons set forth above, this publication, combined with the other publications cited above does not teach or suggest a composition containing 1-imidazolylmethyl-substituted 2-naphthol compound

of the general formula (I) in combination with a phenol selected from the group consisting of 1,4-n-pentylphenol, n-hexylphenol, n-heptylphenol, n-octyphenol, n-decylphenol, and O,O'-diallyl-bisphenol A with a weight ratio of the compound of formula (I) to phenol being from 30:70 to 70:30 as presently claimed.

Therefore, in view of the amendments and remarks above, Applicant respectfully requests the rejection of claims 1-5, 8-11 and 13-15 under 35 U.S.C. § 103(a) be withdrawn.

Conclusion

It is respectfully submitted that claims 1-5, 8-11 and 13-15 are patentable and are in a condition for allowance. Applicant respectfully requests all pending claims be allowed and that the application pass to issuance.

Respectfully Submitted,

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